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preparation of this treatise the authors have examined every important book and monograph that has appeared upon the subject, consulting the principal libraries of Europe as well as America, examining many manuscripts, and sifting the evidence with greatest care. The result is a scholarly discussion of the entire question of the origin of the numerals, the introduction of the zero, the influence of the Arabs, and the spread of the system about the shores of the Mediterranean and into the various countries of Europe.

The work is illustrated with numerous facsimiles from early inscriptions and manuscripts, most of which have not heretofore been published in connection with this subject, and all of which contribute to a very marked degree to an understanding of the problem.

The Courtis Standard Tests in Arithmetic. By S. A. Courtis. Detroit, Mich., 441 John R. Street. Pp. 40. Manual of Instructions, .25 cts.

Education as a science must always be seriously handicapped by the difficulty of measuring results. Only of recent years has the desirability of measuring educational results been advocated. Even now, so many factors enter into the problem, factors largely of a psychological character, that most of us would hesitate to have the results of our teaching tested, save in a very general way. We are beyond the old notion that examinations are sure tests of effective teaching, and the progressive teacher of today would never admit that his great ambition was to have his pupils successfully pass State Board or College Entrance Tests. Nevertheless, the examination idea, which is not fundamentally wrong, must be postulated in all efficiency tests in mathematics, and efficiency tests are so reasonable in most walks in life, that it seems most probable that there is such a thing as measurable efficiency in mathematical teaching.

Professor S. A. Courtis, head of the department of mathematics and science in the Detroit Home and Day School, has for several years made use of comparative tests for purposes of supervision. During this time he has developed a system of "Standard Tests" which are suitable to test ability in arithmetic as taught in the years preceding the high school. The author suggests the following ways in which they may be useful: as comparative tests, given to many classes under identical conditions; to measure growth during any school year; to show the teacher the weak and strong places in his teaching; to enable principals and superintendents to compare teachers, grades, schools, and even school systems.

Fourteen separate tests, or papers, have been devised—all confined to the four fundamental operations, including easy applications. Each test is timed so that the most rapid pupil will not have completed the work within the limit. Mr. Courtis recognizes that ability in arithmetic is exceedingly complex. Not claiming that his analysis is complete, the author aims to measure the following component abilities: control of knowledge of the fundamental combinations in each of the four operations; control of the symbols, processes, and forms of each of the four operations; rate of motor activity; ability to "borrow and carry"; attention to mechanical details; recognition of the particular operation required (reasoning); and the ability to use all the above in the complex situation of abstract examples, or two-step problems.

Explicit directions are given for giving the tests and for scoring the results. Uniform blanks are furnished on which to tabulate the results and teachers are encouraged to send these records to the author's headquarters where Professor Courtis is making a careful study of the material thus collated. The tests are printed in convenient form for the pupil's use, and are sold without profit to those who will co-operate with the author in these investigations; to independent workers the cost is also very moderate.

The thoroughness with which Mr. Courtis has standardized his tests is an indication of the careful study he has given to the problem. He has met the criticisms that generally apply to such pedagogic studies, and his directions to teachers, if carefully followed, should remove from the individual experiment much of the error resulting from peculiar personal conditions and environment.

Some teachers will object to these tests on the ground that they are too easy even for young children. In this connection, the following observation of the author is interesting: "Experience has shown that the mistakes, except for the zero combinations, are very few. Ignorance is shown, not by mistakes, but by reduced speed. The answers written are usually right except in the very lowest grades." Throughout the tests great emphasis is placed on speed. It is a grave question whether speed and accuracy, and speed and mathematical power go hand in hand. We have seen speedy computers both inaccurate and poor thinkers; conversely, slow computers are sometimes accurate, and strong reasoners. Speed is a very valuable accomplishment these days, and accuracy is essential; but most valuable of all is reasoning power. The inculcation of this important habit is the chief business of the teacher of mathematics, even of the teacher of arithmetic. Will not Professor Courtis put more stress on *reasoning* when devising additional tests to supplement this useful collection?

Elements of the Differential and Integral Calculus (Revised Edition). By William Anthony Granville. Boston: Ginn & Company. Pp. 463, $2.50.

While retaining the fundamental characteristics of the original edition, this new edition will be found thoroughly modern and more teachable than before. Besides the changes which may be attributed chiefly to the recent developments in the study of the calculus, special notice may be taken in the Revised Calculus of the abridgment of introductory material; the introduction of biographical sketches of the leading men connected with the history of the calculus; and the addition of a large number of examples without answers, miscellaneous examples, and simple, practical problems, based on knowledge that all students of the calculus should have at their command.